



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE

United States Patent and Trademark Office

Address: COMMISSIONER FOR PATENTS

P.O. Box 1450

Alexandria, Virginia 22313-1450

www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
|-----------------|-------------|----------------------|---------------------|------------------|

10/551,271

09/28/2005

Masahiro Tada

09792909-6378

4665

26263

7590

12/02/2008

SONNENSCHN NATH & ROSENTHAL LLP

P.O. BOX 061080

WACKER DRIVE STATION, SEARS TOWER

CHICAGO, IL 60606-1080

EXAMINER

TSAL, H JEY

ART UNIT

PAPER NUMBER

2895

MAIL DATE

DELIVERY MODE

12/02/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/551,271

Applicant(s)

TADA ET AL.

Examiner

H.Jey Tsai

Art Unit

2895

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 September 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-5 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SG/US)
Paper No(s)/Mail Date 9/30/2008
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-2 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Brunner 2005/0221528, previously applied, in view of Chatzandroulis et al. 6,704,185, newly cited, and Wolf, vol. 1, pages 331-332, previously applied.

Brunner discloses a method for manufacturing a micromachine including an oscillator, comprising:

a step of forming a sacrifice layer 209, 205 around a movable portion of the oscillator 206; para. 26, 37-49, figs 3a-3f,

the sacrifice layer 209, 205 comprising silicon oxide, para. 40, 38,

a step of covering the sacrifice layer with an overcoat film 211,

followed by the formation of a penetrating hole 213 reaching the sacrifice layer 209, 205 in the overcoat layer 211;

a step of performing sacrifice-layer etching for removing the sacrifice layer 209, 205 using the penetrating hole 213 in order to form a space around the movable portion 206; and a step of performing a film-formation treatment at a reduced pressure

(vacuum and sputtering) following the sacrifice-layer etching so as to form a wiring layer that seals the penetrating hole, para.46, and see col. 8, lines 1015, fig. 10d of Chatzandroulis et al., the film-formation treatment forms a wiring layer 61 having one end sealing the penetration hole 60, and the other end of wire with a contact pad.

regarding claim 2, wherein the method is applied to a micromachine having means for driving oscillation in the oscillator, para. 26, 46.

regarding claim 5, wherein the film-formation treatment at a reduced pressure is a film-formation treatment by sputtering, para. 46.

The difference between the references applied above and the instant claim(s) is: Bruner teaches at para. 46, 40 and 38, using sputtering aluminum for film-formation treatment to seal the penetration hole and doped silicon oxide for sacrificial layer 209 and 205 but does not teach using film-formation treatment as a wiring layer that seals the penetration hole, and using aluminum copper or aluminum silicon material. However, Chatzandroulis et al. teaches at fig. 10d, col. 8, lines 1-5, the film-formation treatment forms a wiring layer 61 having one end sealing the penetration hole 60, and the other end of wire with a contact pad. Wolf teaches at vol. 1, pages 331-332, aluminum alloy including Al-Cu and Al-Si are more frequently used than pure aluminum in microelectronic application because they possess enhanced properties for interconnect requirement. Bruner also teaches at para. 10, preferably the silicon oxide is silicon dioxide; when silicon oxide is referred to in this document, silicon dioxide is the most preferred embodiment, although conventional, doped and/or non-stoichiometric silicon oxides are also contemplated.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the above Brunner's teachings' process by using film formation treatment to form a wiring layer that seals the penetration hole as taught by Chatzandroulis et al. because wiring layer can connect to the MEMS device through the sealed penetration hole.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the above Brunner's teachings' process by using frequent used aluminum alloy including aluminum copper or aluminum silicon for metal film formation as taught by Wolf et al. because both aluminum copper and aluminum silicon posse enhanced properties for interconnect requirement in microelectronic application so that all metal layers in the microelectronic mechanical device would have enhanced aluminum property.

Claims 3-4 are rejected under 35 U.S.C 103 as being unpatentable over Bruner in view of Chatzandroulis et al. and Wolf as applied to claims 1-2 and 5 above, and further in view of Lin et al. 5,589,082 or Schmid 6,761,068, previously applied.

The difference between the references applied above and the instant claim(s) is: Bruner in view of Wolf et al. teaches forming a MEMS device having an oscillator but does not teach the means for driving the oscillation. However, Lin et al. teaches at col. 1, lines 25-31, means for driving oscillation is piezoelectric and at col. 1, lines 60-65, means for driving oscillation is electrostatic force. Lin et al. also teaches at fig. 7Q-7S, col. 11, lines 17-37, a step of forming a sacrifice layer 452 around a movable portion of

the oscillator 450, a step of covering the sacrifice layer with an overcoat film 456, followed by the formation of a penetrating hole 458 reaching the sacrifice layer 452 in the overcoat layer, a step of performing sacrifice-layer etching for removing the sacrifice layer 452 using the penetrating hole 458 in order to form a space around the movable portion 450; and a step of performing a film-formation treatment at a reduced pressure following the sacrifice-layer etching so as to seal the penetrating hole. Schmid teaches at col. 4, lines 1-12, means for driving oscillation are static electric or piezoelectric.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the above references' teachings by using static electric or piezoelectric for driving oscillation as taught by Lin et al. or Schmid because static electric and piezoelectric would cause the movable portion of the device to oscillate so that an oscillation is formed.

Conclusions

Applicant's arguments filed Sept. 15, 2008 have been fully considered but they are not persuasive. Because newly cited reference Chatzandroulis et al. teaches forming a wiring layer 61 having one end of wire that seals the penetration hole, and the other end of wire with a contact pad as set forth above.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to H. Jey Tsai whose telephone number is (571) 272-

Art Unit: 2812

1684. The examiner can normally be reached on from 7:00 Am to 4:00 Pm., Monday thru Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Drew Richards can be reached on (571) 272-1736.

The fax phone number for this Group is 571-273-8300.

/H.Jey Tsai/

Primary Examiner, Art Unit 2895

12/2/2008